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VA scientists create flow control tool

by Melissa Withrow, Air Vehicles Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Air Force Research Laboraotry scientists from the Air Vehicles Directorate (VA) are creating a new tool under the Flow Control Analysis Development (FlowCAD) program.

The tool will facilitate designing flow control devices by modeling their behavior. Currently, scientists use a trial and error design method, but the new tool will tell them how effective a flow control device will be prior to building it. This capability will save the Air Force time and money.

VA recently completed the first stage of tool development with three days of wind tunnel testing at the Aircraft Research Association in Bedford, England. During testing, scientists collected data measuring how high- and low-frequency flow control devices affected air flow over weapons bay openings at transonic speeds. This testing was the first of three experiments designed to collect data that will further understanding of flow control.

Opening weapons bay doors during high-speed flight creates a shear boundary layer or an area where airflow transitions sharply from the high speed air flow outside the weapons bay to slower speed air flow within the bay. As a result, pockets of circular rotating air hit the weapons bay walls and generate an acoustic wave. This wave flows back up the air stream producing acoustic resonance, which causes strong vibrations that may damage the aircraft and its systems. Flow control devices are designed to counter this effect. @